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THE FRED S. KELLER SCHOOL

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FRED S. KELLER SCHOOL AND

COLUMBIA UNIVERSITY'S TEACHERS COLLEGE

The Fred S. Keller School is located in Yonkers, New York, and is one of several schools operating as a Comprehensive Application of Behavior Analysis to Schooling (CABAS®) program. CABAS® schools are self-correcting and self-sustaining, and incorporate the science of teaching into every aspect of schooling. The Keller School functions as a cybernetic system of education in which the individualized instruction of each student influences the behavior of the entire education community. Student opportunities to learn are continuously measured, graphed, evaluated, and, as necessary, modified. Staff training occurs as a function of the programmatic needs of each student and the repertoire of the individual staff member. Supervisors are master teachers whose behavior is directly tied to the learning of the students and other staff. Parents are also taught principles of behavior as they relate to the education of their child, and parenting behaviors are changed based upon the needs and progress of the child. The behavior of the entire school (including efficacy and efficiency measures, the development of repertoires) is influenced by the performance of each individual within it.

DESCRIPTORS: Fred S. Keller, schooling, behavioral systems analysis, personalized system of instruction, organizational behavior management

When Fred S. Keller's most influential writings are summarized, *Peter Opossum Goes to School* may not be at the top of everyone's list. However, this work was near and dear to Keller's heart and has influenced others in the education field. Through the eyes of young Peter Opossum, a new student at the Pine Tree School, Keller describes a wonderful school based upon the principles of behavior analysis and the personalized system of instruction, or PSI (Keller, 1984). In this school, information is broken down into units, and students aren't taught what they already know. Students learn at their own pace, recycle material until it is mastered, and learn new information with the assistance of proctors. Perhaps most important, the positive reinforcement of learning prevails.

When Keller read this tale at the 10th annual banquet of the Association for Behavior Analysis (ABA), the audience enjoyed its cute descriptions, premise, and hope for the future. R. Douglas Greer, Laura Dorow, and Nan McCorkle were in attendance and believed that Keller's vision should become a reality. They designed a plan for a school that would comprehensively apply the knowledge and expertise of the science of behavior to all aspects of schooling, from the behavior of students, teachers, supervisors, and parents, to the behavior of the organizational system itself. Much of the basis for the plan came from Greer's *Design for Music Learning*, which described a PSI and com-

Editor's note. Fred S. Keller provided applied behavior analysts with many exemplars of how to apply the principles of behavior analysis in socially meaningful ways. Of perhaps most importance were his extensive contributions to education. This invited article provides one testimonial to the impact that Keller had on education and, we hope, will serve to stimulate our readers to investigate further his life and accomplishments.

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prehensive token system for bands and choruses (Greer, 1980). This plan, now a model of schooling called CABAS® (Comprehensive Applications of Behavior Analysis to Schooling), is utilized in over eight programs in the U.S. and one in England (additional information on CABAS® may be found in Greer, 1991b, 1994b, 1996a, 1996b, and Selinske, Greer, & Lodhi, 1991).

THE KELLER SCHOOL

Keller and Greer had a long history of sharing their concerns regarding the status of the American educational system and the plight of students. Both believed that the science of behavior, especially the use of mutually reinforcing contingencies, could save schools. Greer, with several of his Columbia University Teachers College doctoral students (then called "Keller Fellows"), first utilized what they identified as components of effective schooling at the Margaret Chapman School in Hawthorne, New York. Out of this work came the measurement of the behavior of an entire school and the data format for future system-wide applications (Greer, McCorkle, & Williams, 1989).

Still pursuing their quest to create an entire school based upon the science of behavior, Greer and Dorow mortgaged their house to obtain start-up money for a preschool in southern Westchester County, New York. Because of Keller's inspiration and shared passion, they thought it fitting to name the school the Fred S. Keller School. With Keller graciously sharing his name, ideas, and moral support, the Fred S. Keller School became a reality in September 1986. Initially, Dorow and McCorkle spent their mornings teaching four preschoolers in the art supply closet of a local day-care center and recruited additional students in the afternoons. Greer provided graduate students as teachers, assistants, or researchers. By the end of the school year, the school had grown to 36 students and had "moved up" from the closet to the back of a church. Now, slightly more than 10 years later, the school is housed in a corporate park and has become a model early childhood program that serves over 60 students, with a national reputation for providing high-quality educational services based upon the principles, strategies, and tactics of behavior analysis—all in the spirit of the Pine Tree School.

As Keller knew, traditional education methods have typically resulted in poor educational outcomes. The Fred S. Keller School's goal is to produce successful educational outcomes. To accomplish this, we utilize a science of schooling that targets the individual. Our educational system is designed so that it is controlled by the progress of the individual student. In the Keller School, and in all CABAS® schools, we use a systems application of the science of behavior to schooling. We do this by (a) applying the science of behavior to pedagogy and incorporating it into all aspects of schooling in a pervasive and sustained manner; (b) establishing the changing behavior of the student as the antecedent and the consequence for the behavior of teachers, supervisors, parents, and ultimately the university and the community; (c) utilizing direct, continuous, and absolute measurement for each unit within the system; and (d) requiring the system to be self-correcting and continually changing in response to empirical data and research.

Students

The Keller School currently serves children between the ages of 18 months and 5 years. Most students have mild to severe educational disabilities (e.g., communication delays, difficulties in academics or social skills, or autism or pervasive developmental disorder) and are referred by their local school district or the Department of Health. We offer on-site special education and inte-

grated preschool classes and work in student homes and mainstream settings. We are a not-for-profit agency with funding provided by federal, state, and local agencies.

Student Curriculum

Priorities for short- and long-term instructional objectives are identified by determining existing repertoires. Deficits are viewed as behavior–environment contingencies that have not yet been taught. Effective instruction requires the student to learn antecedent-behavior-consequence relations and the relevant context. At the Keller School, instruction is individualized and presented during one-to-one, group, and independent activities across four major divisions of instruction: academic literacy, contingency management, problem solving, and an enlarged community of reinforcers (Greer, 1996a). Our student curriculum is based upon a verbal behavior framework (Skinner, 1957) and is heavily influenced by many behavioral models of instruction, including direct instruction, programmed instruction, precision teaching, the eco-behavioral model, and generative instruction.

Student Measurement

Accurate and frequent measurement of learning is a critical component of our instruction. We continuously and directly measure all student responses to instruction and the conditions in which they occur. Most instruction is recorded in the form of learn units—the student–teacher instructional contingency. The learn unit is a basic measure of instruction that incorporates student and teacher interaction, an interaction that has the potential to change the behavior of each (Albers & Greer, 1991; Greer, 1991a, 1994a; Greer & McDonough, 1998). Learn units may be similar to discrete trials, based on intervals, or measured through permanent products, and are presented to both mastery and fluency criteria with generalization strategies programmed into the instructional format. Learn units are summarized by program and are graphically displayed in each student's portfolio. We believe that direct measurement of a child's responses during instruction is the most sound measure of his or her learning. This measurement is used to make empirically driven instructional decisions and to gauge the effectiveness of the teaching.

Teachers

Research indicates that increasing learn units, or opportunities to respond, is a robust indicator of improved performance (Greenwood, Hart, Walker, & Risley, 1994; Greer, 1994a; Hart & Risley, 1996; Heward, 1994). At the Keller School, teachers measure daily the number of learn units they present and student responses to those learn units. Teacher behavior is also monitored via direct observations and contingency analyses, reviews of student portfolios (graphs), and the completion of training objectives. These are direct measures of teacher performance. Together they provide accurate predictions and objective measures of effective teaching (Greer, 1994a, 1994b; Greer et al., 1989; Ingham & Greer, 1992).

Supervisors

The behavior of students and teachers affects the behavior of supervisors. Supervisors assess student learning and teacher effectiveness and have their own measures of accountability that are directly tied to student gains. They frequently observe instruction and work with teachers to solve teaching problems. Supervisors conduct and oversee research and guide the system in improvement and change.

Teacher and Supervisor Curriculum

One of the most enduring legacies of Fred Keller is the Keller Plan, or PSI (Buskist, Cush, & DeGrandpre, 1991; Keller, 1968,

1982; Keller & Sherman, 1982). At the Keller School each supervisor, teacher, therapist, and teacher assistant has an individually tailored set of training objectives designed to increase his or her behavioral expertise (Greer, 1991a; Twyman, 1994, 1995). Our PSI plans consist of modules, each associated with a different conceptual or pragmatic issue in the science. A person's level of experience and prior achievement determines the specific activities within each module; however, all modules encompass three repertoires associated with the strategic science of teaching (Greer, 1991a). They are:

1. Verbal behavior about the science (concepts, principles, and terminology). This repertoire emphasizes the language of the science community of behavior analysis. The goal is to describe the principles, strategies and tactics with the precision of the science. Verbal behavior about the science is necessary to engage in and knowledgeably apply the science, and to reliably describe contingency analyses.

2. Contingency-shaped teaching skills (accurate and fluent teaching practices). These repertoires are centered around the classroom performance of the professional. Responses that are contingency shaped are those that are directly reinforced or punished by the nonverbal contingencies in the environment. Scientifically sound practices are typically taught via classroom instruction, with mastery demonstrated when the skill becomes an automatic part of the teaching repertoire.

3. Verbally mediated scientific repertoire (strategic and analytic problem solving). This repertoire incorporates the language of the science and skills of pedagogy to provide the best instructional practices. It demonstrates one's ability to engage in science-based problem solving, where instructional efforts are guided by verbal behavior from the science rather than by an emotional response to the problem. Verbally mediated expertise is evident when one uses data and scientific knowledge (a) to analyze the problem and (b) to change current pedagogical practices, resulting in greater student learning.

The features of PSI utilized in our module training system include self-paced instruction, material divided into units, recycling until mastery, and the use of peer tutors or proctors. Overall, the module system is arranged according to ranks, with higher ranks signifying greater expertise. Promotions, earned authority, salary increases, college tuition and conference assistance, and other job-related benefits are tied to the completion of modules and the corresponding increases in expertise.

Parent Education

Our goal of producing successful educational outcomes cannot be done without parent involvement. We offer a behavioral parent education program teaching (a) effective and noncoercive parenting practices; (b) the concepts, principles, and tactics from behavior analysis; and (c) nonadversarial advocacy skills. Parents are taught how to promote healthy, happy, and safe learning environments in their homes by producing or accelerating desirable behaviors while avoiding interactions that lead to coercive behavior traps. As they work with their children, parents are taught to measure learning directly and to make decisions based upon these measurements. They master the concepts and terms of the science of behavior so that they can evaluate accurate or faulty teaching practices. Parents are taught how to recognize and advocate effective education and become knowledgeable consumers of the educational options available to them.

The University

Greer serves as the education consultant for the school and provides us with guidance and additional overview of the system. The

Keller School is an internship site and a laboratory setting for graduate students from Columbia University Teachers College. Typically 10 to 15 masters or doctoral students improve their teaching repertoires and add to the research base at the Keller School each year.

Outcomes

In our self-correcting system, data are used to make decisions regarding contingencies and methodology for students, teachers, supervisors, parents—the entire school. When the data demonstrate that effective educational practices are not occurring, the relevant contingencies are analyzed and altered. School-wide data provide a week-by-week and year-by-year analysis of the effectiveness of the system.

The outcomes for graduates from the Keller School show the relevance of this systems approach. Most graduates go on to mainstream or less intensive special education programs, thus needing far less public support than would have been required without such intervention.

PROFESSOR KELLER VISITS THE SCHOOL

Through letters, phone calls, and an annual ABA convention breakfast with the founders and other members of the school, Keller kept in contact with us, often offering words of encouragement and support. Each year we talked about how wonderful it would be for him and Francis to visit, but his increasing age and reluctance to travel hampered plans. Finally, it seemed that the Kellers had to visit soon, or the opportunity would be missed. We excitedly planned a trip for June 1994.

"Francis, would you get a look at this!!!" No greater praise could be given than the sight of Keller bouncing happily from student to student and classroom to classroom, calling to his wife all along the way. He delivered "high fives" and hugs, and warmth and encouragement everywhere he went. We had waited 8 years for this day, and it had finally come. The teachers and students got to know the Kellers during the day, and the parents met them that evening at our annual parent poster session. His enthusiasm was infectious. In a newsletter for the Cambridge Center for Behavioral Studies, Keller described his impressions of the school:

> The forenoon class of 36 students (one-half of the student body) was in session—six students to a room with a teacher and her assistant, suitably provided with equipment, and with attractive decorations on the walls. The teacher and assistant were engaged in reinforcing "learning readiness" skills, language skills, special play responses, and "peer socialization"—everything on a one-to-one basis, with a record kept of each response and its reinforcement. We passed from room to room; in each I looked in vain for "trouble-makers" among the three-year-olds—whiners, non-responders, screamers, sleepers and the like. Instead we found in every room a busy group, undisrupted by our presence to any marked degree, but ready to exchange a smile or, on some occasions, to "gimme five!" The experience was, for both of us, enjoyable, impressive, and unique. (Keller, 1994, p. 3)

Keller's visit was a wonderful event for the Keller School. We were able to see the school from the perspective of the man who had inspired and shaped us. We were both delighted and relieved that Keller was proud of his relation to us, and that he saw us as we hoped to be, "an interlocking system in which the success of every member—student, assistant, teacher, or administrator—was derived from the success of all the mem-

Fred Keller visits the Fred S. Keller School in June 1994.

bers" (Keller, 1994, p. 4). True to his never-ending generous spirit, Keller even remembered the school at the time of his death by requesting that remembrances in his honor be sent to the Keller School. We'd like to thank the great number of his friends and colleagues who have done so. Fred S. Keller inspires us and remains in our hearts forever.

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